EPA Region 7 TMDL Review

TMDL ID:	IA 02 CED-0030_2	**Waterbody ID:**	IA 02-CED-0030_2
Waterbody Name:	CEDAR RIVER		
Tributary:	CEDAR RIVER		
Pollutant:	NITRATE		
State:	IA	**HUC:**	0708205
BASIN:			
Submittal Date:	10/2/2006		
Approved:	Yes		

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

The TMDL for Cedar River was formally submitted by the Iowa Department of Natural Resources (IDNR) in a letter received by EPA on July 7, 2006. A revised version was submitted and received by EPA on October 2, 2006.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

For the Cedar River TMDL, the load capacity goal is derived from the nitrate-N drinking water standard, adjusted with a 5% margin of safety. This makes the in-stream concentration for all flows at or below 9.5 mg/l nitrate-N, with no exceedances within the 11.6-mile impaired segment. The annual nitrate load was established using the Water Quality Simulation Program (WASP) and Diffusion Analogy Surface Water Flow (DAFLOW) modeling conducted with daily time steps. Further, the TMDL is also expressed as a load duration curve based on flow records from the USGS gage 05464500 (Cedar River at Cedar Rapids, IA) and in-stream nitrate measurements taken at Cedar Rapids. Excluding wildlife, atmospheric deposition, and point sources, the relative decrease to each remaining nitrogen input is 37%. This reduction in nitrogen loading should result in attainment of applicable drinking water standards.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

Designated uses of this segment of the Cedar River are primary contact recreational use (Class A1); significant warm water aquatic life use (Class B(WW) and drinking water supply use Class (C). In 1998, this segment of the Cedar River was included on the impaired waters list due to high nitrate concentrations in the drinking water supply for the City of Cedar Rapids. The Class C (drinking water) uses were assessed as "fully supported/threatened" with a declining water quality trend due to violations of the state water quality standard.

The TMDL objective is to target a concentration no higher that 9.5 mg/l nitrate-nitrogen in the impaired area. A concentration-based 35% reduction is equal to a yearly load reduction of 9,996 tons nitrate-N/year from the current average modeled load of 28,561 tons nitrate-N/year.

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The Cedar River nitrate TMDL load reductions are designed to reliably meet the drinking water standard for nitrate directly, with an explicit margin of safety of 5%. No surrogate measures are targeted. Reductions are required for non-point source loads such as runoff from feedlots and pasture lands, manure applied to cropland and pasture that are transported by precipitation events and those that are relatively constant such as cattle in streams and failed septic tanks. To achieve the standard, there must be 35% reduction in nitrate-N loads delivered by surface runoff. The load allocations and margin of safety do not exceed the load capacity.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Nitrate concentrations are influenced by both point and non-point sources. The point source contribution comes from 111 unique facilities with National Pollutant Discharge Elimination System (NPDES) organic water permits. As a conservative assumption for modeling no removal of nitrogen by 103 treatment facilities was assumed in designating point source loads.

Potential non-point sources include agricultural activities, inadequate on-site septic tank treatment systems, wildlife, run-off from built-up areas, and atmospheric deposition. The primary source for surface water nitrate in Iowa is agriculture, specifically from the widespread use of anhydrous ammonia, application of livestock manure, legume fixation, and mineralization of soil nitrogen.

A total of two confined animal feeding operations (CAFOs) with NPDES permits were included, though permitted loading from CAFOs are zero tons/year (no discharge). Atmospheric deposition and natural, or background, sources of nitrogen in the form of decomposing organic matter and excrement from wildlife have also been considered as possible candidates for nitrogen loading. It appears all sources of nitrate have been considered.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Load allocations for this TMDL are listed by watershed sub-basins and contributing sources. Table 17 lists the existing loading and TMDL load allocations of total nitrogen needed to receive a 35% reduction in nitrate-N at the impaired site. Although Iowa has no authority in regulating pollution from Minnesota, a 35% reduction in total nitrate-N loading is assumed in this TMDL scenario. Table 18 represents nitrate-N loads and TMDL reductions from Minnesota. Implementation to achieve reduction in nonpoint source loading is not reviewable by EPA.

The WLA for point sources are set at the existing load and will remain static to limit the further influence of point sources on nitrate levels in the Cedar River. Point sources will also be responsible for maintaining water quality standards during low flow and dry conditions. Water quality during these conditions does not exhibit violations of the standard at this time.

WLA Comment

The waste load allocations have been set at the existing levels, requiring no reductions at this time because the point sources WLAs make up only 9% of the annual average load for the Cedar River impaired segment. This is an assumption based on no effective treatment by 103 of the 111 NPDES facilities in the watershed. It also assumes no in-stream biological processes act on point source loaded nitrogen while natural processes do act to reduce nonpoint source loads of nitrate. WLAs in NPDES permits are presently set to protect water quality during critical low flow conditions. The lack of excursions during these critical low flow periods indicates that the current permit limits are protective. Further reductions in point source loadings are not likely to have any measurable effect on the TMDL targets.

LA Comment

Nonpoint source pollution is the greatest contributor of nitrate to the Cedar River. For the greatest benefit, wetlands, CRP, and other BMPs should be installed at locations that have the greatest ability to influence both nitrate and water flow. The load allocations for the total nitrogen needed to receive a 35% reduction in nitrate-N at the impaired site are listed on Table 17 in the TMDL. The daily load is represented by the load duration curves presented in the TMDL which apply at the actual flow at any given day.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is both explicit and implicit in the TMDL. The explicit MOS is a 5% buffer for the 10 mg/l nitrate-N concentration limit and is incorporated over the entire Cedar River watershed. The MOS is also reinforced through conservative assumptions implicit in the representation and modeling of point and non-point sources. For example, point source contributions were calculated under the conservative assumption of no total nitrogen loss (denitrification) between the input and effluent of 103 of 111 NPDES permitted facilities. In other words this assumed a standard loading based on population and industry with no effective removal by treatment for most of the permitted facilities in the watershed.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

The TMDL for nitrate describes that the high nitrate concentration values occur during the spring and summer months and result from a number of factors, including manure and fertilizer, snow melt, and wetter conditions. Because the critical conditions are at high flow, nonpoint source reductions are targeted in the TMDL.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

Public informational meetings were held in Cedar Rapids, Charles City, and Waterloo on June 7, 2001 and June 8, 2001. Additional meetings were held in 2005. Public meetings were held in Cedar Rapids, Charles City, and Waterloo on May 15, 2006 and May 17, 2006 to present and discuss the draft TMDL. The draft TMDL was available on Iowa DNR's web site to commence a 30 day public comment period and ended on June 2, 2006.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Water quality monitoring will continue in the Cedar River at the USGS stream gauging stations by the Iowa DNR Ambient monitoring program, the USGS, and the Cedar Rapids water treatment plant. This monitoring will continue indefinitely as long as funding is available.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

Nitrate concentration in the Cedar River is highly seasonal, with most peaks occurring during the spring months of May and June. Streams impaired by point source pollution have critical conditions associated with low flow and dry conditions. Conversely, critical conditions for systems dominated by non point source pollution generally are correlated with wet conditions and high flow brought on by precipitation and snowmelt. The load duration curve clearly indicates that nitrate-N exceedances occur only during wetter conditions and high flows of the Cedar River, and therefore primarily caused by non point source pollution.

Wastewater point sources in the watershed have been found to be a relatively minor fraction of the total nitrogen load to the Cedar River, particularly during the high-flow conditions when violations of the 10 mg/L water quality standard are occurring. Reasonable assurances are not required because further reductions in point source loadings are not likely to have any measurable effect on the TMDL targets since violations occur at high flow.

Extensive non point reductions are required to meet the standards set by this TMDL. Non point sources are more dispersed than point sources and are controlled by field and watershed scale Best Management Practices (BMPs), Conservation Reserve Programs (CRP) and the Conservation Reserve Enhancement Programs (CREP). Various projects can be funded through Clean Water Act Section 319 grants.